
Stylistic Patterns in Language Teaching Research Articles: A Multidimensional Analysis

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Abstract

This paper presents the results of a multidimensional analysis to investigate stylistic patterns and their communicative functions in language teaching research articles. The findings were that language teaching research articles contained six stylistic patterns and communicative functions. Pattern I consisted of seven salient positive features (i.e. Present Perfect Aspects, Split Auxiliaries, Type Token Ratio, Possibility Modals, Total Adverbs, Infinitives, and That Relative Clauses on Subject Position) which co-occurred to perform a 'Persuasion Focused' function. Pattern II consisted of eight salient positive features (i.e. Predicative Adjectives, Be as Main Verbs, Analytic Negations, Downtoners, Emphatics, Demonstrative Pronouns, Predictive Modals, and Adverbs) which co-occurred to perform an 'Evaluative Stance Focused' function. Pattern III consisted of seven salient positive features (i.e. Suasive Verbs, The Pronoun It, That Verb Complements, Private Verbs, Wh Relative Clauses on Subject Positions, That Deletion, and Adverbial Subordinators) which occurred to perform a 'Claim Focused' function. Pattern IV consisted of five salient positive features (i.e. Present Tense, Conjunctions,

That Verb Complements, Attributive Adjectives, and Phrasal Coordinations) and three negative features (i.e. Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives) which co-occurred to perform 'Established Knowledge versus Past Action Focused' functions. Pattern V consisted of six salient positive features (i.e. First Person Pronouns, Public Verbs, Third Person Pronouns, Causative Adverbial Subordinators, and That Deletion) which co-occurred to perform a 'Ownership Focused' function. Pattern VI consisted of five salient positive features (i.e. Gerunds, Present Participial WHIZ Deletion Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives) which co-occurred to perform a 'Modified Information Focused' function. The implication for instruction and future research has been presented in the Discussion.

Keywords: Genre Analysis, corpus analysis, language teaching research articles, stylistic patterns, lexico-grammatical features, multidimensional analysis

Research articles (RA), which are written by researchers, to distribute knowledge to the academic community, is an important genre (Hyland, 2000). One language that is widely used for writing research articles is English (Kaplan, 2005). However, not all researchers, particularly non-native English researchers, can use this language fluently to create such a genre. They sometimes are placed at a distinct disadvantage and thus feel marginalized from the international scientific community (Burrough-Boenisch, 2003; Cho, 2004; Flowerdew, 1999; 2011; Swales, 1990). According to Kaplan (2005), this might be because they lack knowledge about possible lexico-grammatical choices. Kaplan (2005) further stated that to create a good research article, researchers must be aware of linguistic conventions associated with this genre.

In 1990, Swales (1990) investigated RAs and proposed the Create a Research Space (CARS) model which provided a valuable framework for genre studies. Later, several researchers in Swalesian tradition explored the rhetorical moves of the different RA sections of different disciplines. These included Swales and Najjar's (1987), Samraj's (2002), Hirano's (2009), Loi and Evan's (2010), and Sheldon's (2011) investigations of moves in the Introduction section; Lim's (2006) and Bruce's (2008) studies of the Methods section; William's (1999), Bruce's (2009), and Lim's (2010) investigations of moves in the Results section; and Dudley-Evans' (1988) and Peacock's (2002) investigations of moves in the Discussion section.

Although earlier studies focused on investigating the communicative purposes of rhetorical moves in RAs, there were some studies that attempted to investigate RAs by employing a corpus linguistic technique to describe communicative functions of lexico-grammatical features. These lexico-grammatical features include lexical features (e.g. type-token ratio, word length), semantic features (e.g. hedges, emphatics, speech act verbs, mental verbs), grammatical features (e.g. nouns, prepositional phrases, attributive and predicative adjectives, past tense verbs, perfect aspect verbs, personal pronouns), and syntactic features (e.g. relative clauses, adverbial clauses, that complement clauses, passive post-nominal participial clauses).

Studies of lexico-grammatical features in RAs are mainly characterized by two focuses, namely phraseology and metadiscourse. The former tends to focus on investigating collocations and lexical bundles (Cortes, 2004, 2007; Gledhil, 2000; Hyland, 2008, William, 1999) while the latter, which this study is more related to, tends to focus on understanding how writers organize their arguments and present themselves and their attitudes through lexico-grammatical features (Abdollahzadeh, 2011; Hyland, 1998).

Even though, most previous metadiscourse studies focused on single specific feature specifically, such as first person pronouns (Kuo, 1999), there has been a shift towards studying sets of lexico-grammatical features with use of multidimensional analysis (a

statistical analysis on data which takes into account many different relationships, each of which represents a dimension), for example Kanoksilpatham (2003) investigated stylistic patterns (the use of a variety of techniques to apply an auxiliary meaning, idea, or feeling to the research article) of 41 lexico-grammatical features in biochemistry RAs; Getkham (2010) investigated stylistic patterns of 38 lexico-grammatical in applied linguistics RAs; and Baoya (2015) investigated stylistic patterns of 42 lexico-grammatical features in educational RAs. These three studies show that, in RAs, lexico-grammatical features no longer adhere to a traditional grammar, where each lexico-grammatical feature can have different communicative functions depending on the genres they occur in (Kolln, 2013). Moreover, when some lexico-grammatical features occur together, they provide some shared communicative functions (Baoya, 2015, Getkham, 2010; Kanoksilpatham; 2003).

To the best of my knowledge, there has not been a study employing a multidimensional analysis to investigate stylistic patterns of Biber's (1988) 67 lexico-grammatical features in language teaching RAs. Therefore, to push the knowledge edge, to make a significant contribution to the knowledge base of the research genre especially language teaching RAs, to help the linguistically disadvantaged NNE and novice researchers language teaching researcher in their competition for international publication, to provide ESP/EAP practitioners in the discipline as a valuable tool for writing the RA, this study employed a multidimensional analysis to investigate stylistic patterns of lexico-grammatical features in 30 articles from 5 international language teaching journals. Based on the problems above, the researcher would need to ask two questions to determine the purpose of this research:

i) What are the stylistic patterns of lexico-grammatical features in Language Teaching Research Article Corpus?

ii) What is the communicative function of each stylistic pattern of lexico-grammatical features in Language Teaching Research Article Corpus?

With the discovery of stylistic patterns of lexico-grammatical features in language teaching research articles, this study provided insight into the genre. The novice and the non-native researcher (especially in the related disciplines) could consider the comprehensive descriptions of the salient lexico-grammatical features and the stylistic patterns used in Language Teaching Research Article Corpus as a useful tool for crafting effective and publishable research articles. Furthermore, detailed and comprehensive delineations of the characteristics of the research article genre provide ESP / EAP practitioners with valuable information for curriculum development.

Methods

Before investigating the stylistic patterns of 67 lexico-grammatical features, a Language Teaching Research Article Corpus (LTRAC) needed to be generated. LTRAC contained 30 research articles (6 articles from top 5 language teaching journals). The selection of journals was based on the ranking of journals in *SCImago Journal Rank 2014*. The ranking confirmed that all selected journals were from the world's leading academic journals. According to 2014 impact factors, the top five language teaching journals were *Journal of Second Language Writing*, *Language Learning*, *English for Specific Purposes*, *Studies in Second Language Acquisition*, and *Reading and Writing*.

To choose RAs from the journals, 2 criteria were involved, namely i) any RAs with identical lists of authors were not selected and ii) any RAs with a length of less than two thousand words were not selected as those articles would not be large enough for a meaningful investigation.

However, it should also be noted that no effort was made to check whether the authors of the articles were native or non-native in English, because this study did not take native language status as a variable. Another reason was that there was no reliable way to do so, where a reference to an author's name and institutional affiliation, as some researchers have done, would not be a reliable method. Importantly, according to Lee and Chen (2009), all articles published in

the top 5 leading international journals must have passed a rigorous peer review, proof-reading, and editorial process and thus were assumed to be a representative sample of expert writing.

After that, all the 30 selected research articles were converted to and saved as text files (.txt). Several adjustments were made to the saved texts to promote consistency in the lexico-grammatical feature frequency counts. This imperative step involved: i) removing all irrelevant sections such as titles, abstracts, key words, affiliations, bibliographies, footnotes, acknowledgments, graphics, tables, figures, page numbers, and examples; ii) deleting empty lines, redundant spaces, hard carriage returns, etc., to prevent tagging errors which could lead to inaccurate analysis; ii) unifying spelling to ensure that words were consistently spelt the same to avoid errors in word frequency counts; iv) removing mathematical formulas and foreign characters with codes to avoid tagging errors; and v) deleting extended quotes by participants in the results section since these quotes, normally colloquial in style and often extended in length, did not reflect the writers' language, which was the very target of investigation in this study. These adjustments were necessary to rule out the inflation of the count of lexico-grammatical features and numbers in the texts.

All 30 articles were appointed with 'T' followed by an ordinal number (T31-T60). The files in LTRAC_1 were parallel to LTRAC_2. The latter folder consisted of authentic texts of the 30 articles, the former consisted of the tagged texts.

In sum, the LTRAC consisted of 30 language teaching RAs with 228,891 running words. According to scholars (Baoya, 2015; Brett, 1994; Flowerdew, 2011; Getkham, 2010; Kanoksilpatham, 2003; Samraj, 2002) the total number of articles and running words confirmed the validity of the corpus and therefore, this corpus was large enough for an effective linguistic investigation. Next, the results for each research question are presented.

Results

Research Question I, "What are the stylistic patterns of lexico-grammatical features in Language Teaching Research Article Corpus?"

To answer this research question, a multidimensional analysis was employed to investigate stylistic patterns of 67 lexico-grammatical features. These features represent different lexical, semantic, grammatical, and syntactic features (*e.g. verbs, adjectives, pronouns, past tense, present perfect aspects, passive voice, relative clauses, adverbial clauses, complement clause types, public verbs, suasive verbs, hedges, downtoners, etc.*). As with previous studies (Baoya, 2015; Biber, 1988; Getkham, 2011; Kanoksilapatham, 2003), this study normalized the frequency of all lexico-grammatical features to 100 words. However, the results of the frequency count indicated that some features had too many zero frequencies across the corpus. This indicates that some features were rarely used in the corpus. Therefore, this treatment reduced the original variables to 48, still representing the original 67 lexico-grammatical features.

The next step was to determine the best amount of dimensions to include for an analysis by factor extraction and factor rotation. To determine the appropriate number of components to retain, four main issues were taken into consideration. They are

i) eigenvalues (the value of the relative importance of factors): the components which are greater-than-1 eigenvalues were considered (Field, 2000; Rietveld & Van Hout, 1993),

ii) a substantial drop on the scree plot graph: the substantial drop implied an appropriate number of components to retain for investigation (Field, 2000),

iii) a cutoff point for factor loading. In this study, similar to Biber's (2002), lexico-grammatical features with loadings of .35 or greater were chosen, and

iv) a maximum number of loading features on each factor: the co-occurrence of five lexico-grammatical features was the minimum for interpreting the communicative functions underlying a factor (Biber, 2002).

To identify the stylistic patterns of lexico-grammatical features, the present study, following previous researchers (Biber, 1988; 1989; 2002; Baoya, 2015; Getkham, 2010; Kanoksilapatham, 2007), invoked a Principal Component Analysis (PCA): a statistical procedure that uses an orthogonal transformation to convert a set of observations of possible correlated variables into a set of values of linearly uncorrelated variables called principal components. However, before performing PCA, the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity values were inspected to check whether the datasets were appropriate. Both KMO and Bartlett's Test of Sphericity values are measures of how suited the data is for factor analysis. The KMO value was .65 and the Bartlett's Test of Sphericity rendered an associated significant value ($P < 0.001$). Both values suggested that the variables in the dataset were statistically and significantly correlated. Therefore, the datasets were considered to meet the assumptions for a valid PCA (Angsuchote, Vichitwanna & Pinyopanuwat, 2011; Hair *et.al.*, 2010). Next, to determine the retention of an optimal number of factors, the eigenvalues of lexico-grammatical features which were greater than 1 were considered. Eigenvalues-greater-than-1 criterion suggested a sixteen-component model which was too big to enable efficient interpretation. As recommended by Rietveld and Van Hout (1993), the last substantial drop in the scree plot of the eigenvalues of the correlation-matrix was further examined.



Figure 1: Scree Plot of the Components in LTRAC

Figure 1 shows that the last substantial drop in the magnitude of the eigenvalues was at Component 6. According to this procedure, models with the same number of principal components, as the number of eigenvalues at the substantial drop, would then fit the data, meaning a six-component model could be used. Next, a six-component solution was investigated to see how many lexico-grammatical features loaded on the components. According to Biber (2002), there should be at least five loading factors for a meaningful interpretation. Loading factors in the six-component solution ranged from five to eight. The six-component model was, hence, acceptable. Then, a six-component PCA with Promax rotation were performed. Table 1 displays the total variance explained.

Table 1: Total Variance Explained

<i>Component</i>	<i>Initial Eigenvalues</i>			<i>Extraction Sums of Squared Loadings</i>			<i>Rotation Sums of Squared Loadings</i>
	<i>Total</i>	<i>% of Variance</i>	<i>Cumulative %</i>	<i>Total</i>	<i>% of Variance</i>	<i>Cumulative %</i>	<i>Total</i>
1	6.71	13.98	13.98	6.71	13.98	13.98	4.90
2	4.16	8.67	22.65	4.16	8.67	22.65	5.21
3	3.20	6.68	29.33	3.20	6.68	29.33	3.99
4	2.69	5.60	34.93	2.69	5.60	34.93	3.67
5	2.47	5.15	40.08	2.47	5.15	40.08	2.93
6	2.09	4.36	44.43	2.09	4.36	44.43	3.15
7	1.82	3.80	48.23	1.82	3.80	48.23	
8	1.78	3.71	51.94	1.78	3.71	51.94	
9	1.66	3.46	55.40	1.66	3.46	55.40	
10	1.55	3.22	58.63	1.55	3.22	58.63	

Table 1 shows the percentage of the overall variance explained by each and all components in which component 1 (after rotation) accounted for more variance than the remaining five (13.98 % compared to 8.67, 6.68, 5.60, 5.15, and 4.36 %). The six components accounted for 44.43 % of the overall variance. The 44.43 % of variance was considered satisfactory, given the relative homogeneity of language teaching RAs (Baoya, 2015; Getkham, 2011; Kanoksilapatham, 2007). Table 2 represents the dimensional structure of a 6-component model of the forty two lexico-grammatical features in LTRAC.

Table 2: The Six Dimensions of the Stylistic Patterns of the 42 Lexico-grammatical Features in LTRAC

<i>Dimension I</i>	<i>Loadings</i>	<i>Dimension IV</i>	<i>Loadings</i>
Present Perfect Aspects	.79	Present Tense	.63
Split Auxiliaries	.75	Conjuncts	.46
Type Token Ratio	.64	<i>(That Verb Complements</i>	<i>.43)</i>
Possibility Modal	.58	Attributive Adjectives	.41
Adverbs	.57	Phrasal Coordinations	.39
Infinitives	.56	-----	
That Relative Clauses on	.55	Past Participial WHIZ Deletion	-.60
Subject Position		Relatives	-.76
		Past Tense	-.78
		Agentless Passives	
<i>Dimension II</i>		<i>Dimension V</i>	
Predicative Adjectives	.80	First Person Pronouns	.71
Be as Main Verbs	.75	Public Verbs	.67
Analytic Negations	.63	Third Person Pronouns	.63
Downtoners	.57	Causative Adverbial	.56
Emphatics	.55	Subordinators	.39)
Demonstrative Pronouns	.55	<i>(That Deletion</i>	
Predictive Modals	.39	-----	-.45
<i>(Adverbs</i>	<i>.39)</i>	By-Passives	

Nouns	-.45		
<i>Dimension III</i>		<i>Dimension VI</i>	
Suasive Verbs	.77	Gerunds	.73
Pronoun It	.56	Present Participial WHIZ	.60
That Verb Complements	.55	Deletion Relatives	.53
Private Verbs	.46	Average Word Length	.36
Wh Relative Clauses on Subject	.46	Present Participial Clauses	.36
Positions	.40	Demonstrative Adjectives	
That Deletion	.38	-----	-.39
Adverbial Subordinators		Pire-piping Relative Clauses	-.42
-----	-.53	Time Adverbials	
Independent Clause			
Coordination			

Table 2 shows that only 42 lexico-grammatical features co-occurred to form six dimensions, since six features did not load on any dimensions (*i.e. Synthetic Negation, Existential There, Place Adverbials, Nominalizations, Prepositional Phrases, and Sentence Relatives*). There were three lexico-grammatical features that cross-loaded onto more than one dimension (*i.e. Adverbs* loaded on dimension I and II, *That Verb Complements* were located on Dimension III and IV, and *That-deletions* were visible on Dimension III and V). As can be seen from the table, most dimensions consisted of two sets of features: positive and negative loadings, but without negative features in Dimension I.

Furthermore, each dimension contained at least five features, with absolute values ranging from .36 to .80.

Research Question II, “What is the communicative function of each stylistic pattern of lexico-grammatical features in Language Teaching Research Article Corpus?”

To answer this research question, functional analyses were utilized to interpret the six dimensions. Interpretations of the dimensions were based on their shared basic communicative functions. The findings are as follow:

Dimension I consisted of Present Perfect Aspects, Split Auxiliaries, Type Token Ratio, Possibility Modal, Total Adverbs, Infinitives, and That Relative Clauses on Subject Position on the positive end. There were no features visible on the negative end. This dimension contributed to 13.98 % of the total variance, marking the biggest portion.

The Present Perfect Aspect, loading the highest in the dimension, implies a continued validity of earlier findings or practices (Biber, 2002). Although there are several different functions of present perfect aspects in other genres, in RAs it is mainly used as reference to other research, specifically in the field of study or to the writers’ own previous findings (Swales & Feak, 2004, Biber, 1988). Split Auxiliaries are used when an adverb is placed between an auxiliary and the following verb. They explicate the marking of the writers’ own persuasion or argumentative discourse designed to persuade the readers (Biber, 2002; Fowler, 2003; O’Connor, 2003). High Type Token Ratio is interpreted as marking an exact presentation of information, conveying maximum content in the fewest of words. The higher the ratio, the greater the variety of word types and the higher the amount of information integrated (Biber, 2002). Possibility Modals denote the writers’ assessment of the possibility of the propositions presented in a hypothetical scenario (Hasselgard, Lysvag, & Johansson, 2012; Hyland, 2006; Salager-Meyer, 1993). Adverbs index the writers’ attitude and degree of certainty towards the proposition in the clause,

its generalizability or its predictability indicate some degree or quantity of the quality represented by the verb, adjective or the adverb pre-modified, and provide some communicative functions such as focus, viewpoint, and evaluation (Baoya, 2015; Carter & McCarthy, 2006; Hyland, 2006; Varttala, 1999). Infinitives can be used to integrate or expand idea-units in written discourse to introduce an aim, goal, objective, and purpose, to introduce a method, to frame points in a discussion, to introduce a complement and as an adverbial purpose clause (Chafe, 1985; Getkham, 2010). That Relative Clauses on Subject Position include information into a content clause (Sevastopoulos, 2015). Taken the salient features loading on the positive end together, Dimension I focuses on manifesting the writers' persuasion. Accordingly, the term 'Persuasion Focused' was proposed for this dimension.

TEXT SAMPLE I (Discussion of T46) pictures the use of co-occurring positive features on Dimension I. The sample shows the use of Present Perfect Aspects¹, Split Auxiliaries², Possibility Modal³, Adverbs⁴, Infinitives⁵, and That Relative Clauses on Subject Position⁶.

*Based on the results of a research study **that**⁶ used multiple-data analysis to examine MC in four London-based companies, this article **has discussed**¹ some of the strategies that multi-communicators are resorting to as a way of responding to demands for 'doing more in less time'. The results **have indicated**¹ that among the skills exhibited by multi-communicators, the most salient are bringing **together**⁴ communication tasks **that**⁶ deal with the same topics/issues, spreading the communicator's presence over a number of communication instances, deciding what media work **well together**⁴ on the basis of their real or perceived compatibility, and grouping diverse audiences by similar needs/requests. The study **has also provided**^{1,2,4} some evidence **that**⁶ seems **to**⁵ indicate that MC **has started**¹ **to**⁵ reshape the way communication is conceptualized in technology-infused workplaces. It accords with previous research (e.g., Cameron and Webster, 2011 and Reinsch et al., 2008) that the emphasis on 'doing more in less time' **has forced**¹ communicators **to**⁵ learn to juggle tasks, people and multiple media. The present study also extends previous research*

by indicating that MC seems to be causing communication in today's **highly**⁴ technicalized workplaces **to**⁵ place more emphasis on efficiency than effectiveness as **has been traditionally understood**^{1,2,4} and defined. The results of the study **have been used**¹ **to**⁵ inform the design of pedagogical tasks. Like studies **that have explored**¹ the interface between research and pedagogy in other areas of business communication (e.g., Chan, 2009 and Evans, 2012), this study **has used**¹ its main results **to**⁵ design tasks to help students develop key skills for MC in the workplace. These skills, the article **has shown**¹, **can be better developed**^{2,3,4} by technology-supported tasks **that**⁶ simulate real-world communication. The article does not intend to be exhaustive in the number and type of task samples it **has shown**¹ but **rather**⁴ indicative of what technology-enhanced tasks for BE **can**³ offer students in the **rapidly**⁴ evolving workplace communication landscape **that**⁶ **has been changed**¹ by the affordability and accessibility of technologies.

Dimension II was responsible for 8.67 % of the total linguistic variation. The set of Predicative Adjectives, Be as Main Verbs, Analytic Negations, Downtoners, Emphatics, Demonstrative Pronouns, Predictive Modals, and Adverbs on the positive end and Nouns on the negative end form a complementary relationship. Predicative Adjectives and Be as Main Verbs typify the greatest and the second greatest loadings on the dimension. A form of a verb, to be followed by a predicative adjective, is used to enhance the value of the research (Auria, 2008; Baoya, 2015; Hunston & Thompson, 2000; Getkham, 2010; Soler, 2002; Tutin, 2009). Analytic Negations express the writers' dissatisfaction with the current state of affairs (Baoya, 2015), denoting negativity for the purpose of exclusion, negation, denial, rejections, and questioning. Downtoners are used to mitigate the force of assertion, or to indicate uncertainty and tentativeness, thus sounding polite or moderate. Emphatics mark reliability of the proposition and indicate a high degree of certainty toward that proposition. Emphatics (i.e. only) are used to reinforce the effect on the truth value of the clause or part of the clause in which they are applied to, as well as to emphasize a proposition (Biber et.al., 1999; Quirk et.al., 1985). Demonstrative

Pronouns are used to refer to the preceding text or the textual context (Biber et.al., 1999). Predictive Modals mark predictions of events or outcomes (Biber et.al., 1999; Chafe, 1985; Hyland, 1994; Salager-Meyer, 1993; Ventola, 1994). Adverbs express attitude toward the statements of the writers (Baoya, 2015; Carter and McCarthy, 2006; Hyland, 1998, Varttala, 1999; Ventola, 1994). With the consideration of the collective salient positive lexico-grammatical features, the positive end of this dimension significantly focuses on presenting evaluative stances.

On the negative end, there was only one lexico-grammatical feature loaded, namely nouns. Nouns are used as a main lexical means of referential specification, to refer to entities or concepts, or to establish what the text is about. A frequent occurrence of nouns marks a high density of information (Biber, 2002; Biber et.al., 1999; Getkham, 2010). However, only one lexico-grammatical feature was not enough for interpreting the dimensional function. Therefore, the communicative function of this negative end was not interpreted. As seen, Dimension II served as a parameter of textual variation, marking where a text is on a continuum from a focus on presenting evaluative stances. Therefore, 'Evaluative Stance Focused' was proposed for this dimension.

TEXT SAMPLE II (Introduction of T56) illustrates the use of co-occurring positive features on Dimension II. The sample shows the use of Predicative Adjectives¹, Be as Main Verbs², Analytic Negation³, Downtoners⁴, Emphatics⁵, Demonstrative Pronouns⁶, Predictive Modals⁷, and Adverbs⁸.

***This**⁶ included positive changes in students' word reading and reading comprehension skills. While the weighted ES (0.36) for reading fluency **was**² **not**³ **statistically**⁸ **significant**¹, it **was**² **practically**⁴ **important**¹, as defined by What Works Clearinghouse (see Graham et al., 2012), as it exceeded an effect of 0.25. **These**⁶ support and extend an earlier and **more**⁵ limited review showing that spelling instruction enhanced reading performance [ref], and it provided support for theoretical claims about the value of spelling in reading development [ref]. Moderator*

analyses revealed that the impact of formal spelling instruction **was² generally⁸ consistent¹** across grades and types of students (i.e., typically developing students vs. students experiencing difficulty with literacy learning). The **only⁵** exception involved comparisons of formal spelling instruction versus spelling is caught approaches, where the weighted ES for older students (grades 7-10) was **almost⁴** one half the magnitude of the ES for younger students (kindergarten to grade 6). Even so, formal spelling instruction still improved the spelling of these older secondary students. The only hypothesized advantage for formal spelling instruction that was not observed in this meta-analysis concerned the impact of such instruction on writing performance. While formal spelling instruction enhanced correct spelling in writing (as noted earlier), it did not impact other measures of writing performance. The obtained effect **was² positive¹**, but less than one-fifth of a standard deviation. It **was² not³ statistically⁸ and practically⁴ significant¹**. We anticipated that improved spelling performance **would⁷** reduce interference between spelling and other aspects of writing and make cognitive resources previously devoted to spelling available to other writing processes.

Dimension III was represented by Suasive Verbs, The Pronoun It, That Verb Complements, Private Verbs, Wh Relative Clauses on Subject Positions, That Deletion, and Adverbial Subordinators on the positive end, with only one feature on the negative end. "It" is Independent Clause Coordination, consisting of a total of 6.68 % variance. Suasive Verbs frequently followed by a That Verb Complement Clause intend to persuade, convince, recommend, or urge the reader to accept what is expressed, and are used in persuasive language to indicate the importance of the research field, the present research or the findings (Ayers, 2008; Getkham, 2010). The Pronoun 'It' is used as a subject to an impersonal verb, as a provisional subject, when the real subject is an infinitive, and to represent a noun in the neutral gender. It provides a mean for writers to express their comments or attitudes without making their identification explicit (Biber et.al., 1999; Getkham, 2010; Hewings & Hewings, 2002; Kanoksilpatham, 2003). Private Verbs are used for the overt expression of private attitudes, thoughts, and emotions (Biber, 2002). Private

verbs are frequently used with ‘that’ verb complements or ‘that’ deletion to expand ideas or comments. That Deletion is always found with suasive verbs and private verbs, helping to make a sentence more concise (Whitman, 2013). Wh Relative Clauses on Subject Positions are used to provide information (such as thing, time, place, people, and process) into a content clause (Sevastopoulos, 2015). Adverbial Subordinators show slight or major contrast, give reasons and comparisons, as well as indicate time relationships, place, and conditions in the research (Baoya, 2015). Taken the salient positive features in this dimension, the positive end of this dimension focuses on claiming the importance of the findings.

On the negative end, there was an only one lexico-grammatical feature, namely Independent Clause Coordinations. Independent clause coordinations are used to combine or compare ideas, convey cause and effects of events, and elaborate on a claim or extend reasoning (Baoya, 2015). However, only one lexico-grammatical feature was not sufficient to interpret the dimensional function. Thus, the communicative function of the negative end was not interpreted. In sum, this dimension expressed claims. Therefore, the term ‘Claim Focused’ was proposed for this dimension.

TEXT SAMPLE III (Discussion of T44) shows the use of co-occurring positive features on Dimension III. The sample shows the use of Suasive Verbs¹, The Pronoun It², That Verb Complements³, Private Verbs⁴, Wh Relative Clauses on Subject Positions⁵, That Deletion⁶, and Adverbial Subordinators⁷.

*Our data **indicates⁴** **that³** in mathematics definition is crucial to constituting the abstract concepts at the heart of this field, making **it²** central to contextualizing research and contributing to comprehension and persuasion in this field. As such, we argue that definition warrants status as a ‘move’ in the mathematics RAs based on four points. First, the prevalence of Mp in the corpus, as well as **its²** use as an initiating move, **suggests¹** ~~**that⁶**~~ **it²** is central in mathematics RAs. Second, **it²** enables mathematicians to share understanding of the objects discussed. Third, **it²** surpasses shared understanding by affording the basis for new insights in*

mathematics (i.e., novel contributions) and fourth, by establishing agreement about mathematical concepts **it**² enables argument, making **it**² central to constructing knowledge in mathematics. The prevalence of Mp in the corpus should be examined in light of disciplinary assumptions about knowledge in mathematics. First, M3 is the most frequently used move in the corpus (32%) **suggesting that**^{1,3} mathematicians **prefer**⁴ presenting their work to either establishing **its**² importance and generality or highlighting the need for new research. This observation aligns with Morgan's view that because theoretical mathematicians work on original problems, they expect their audiences "to be genuinely interested in knowing the results and to need to be persuaded of the correctness of the results". But Mp is the second most prevalent move (30%), as well as the second most prevalent initiating move (43.3%). Jamison explains the historical precedent of Mp as an initiating move: There is a nearly universally accepted logical and rhetorical structure to mathematical exposition. For over two millennia serious mathematics has been presented following a format of definition-theorem-proof. Euclid's *Elements* from circa 300 bc codified this mode of presentation **which**⁵ is still used today in journal articles and advanced text... **While**⁷ the latter knowledge is probably best gained by students working with research supervisors, writing instructors should ensure that their students understand how generic conventions in any field are always driven by disciplinary assumptions about knowledge.

Dimension IV contained five positive and three negative loadings, explaining 5.60 % of the total variance. The positive loadings were Present Tense, Conjuncts, That Verb Complements, Attributive Adjectives, and Phrasal Coordinations. The negative loadings were Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives. Present Tense, loading the highest on the dimension, is generally associated with topics and actions of immediate relevance. In academic discourse, they have a focus on information being presented without indicating temporal sequencing (Biber, 1988). Conjuncts expand an idea unit, making it more complex. The complexity of phrases and clauses in sciences reflects the typical complexity of the subject matter and the density of information in science (Biber et.al,

1999; Kanoksilpatham; 2003). That Verb Complements are also used to expand idea units or comments. Attributive Adjectives are used to modify and elaborate nominal information, contributing to information density and providing descriptive details about the intended referents (Biber et.al., 1999; Getkham, 2010). Phrasal Coordinations are used to connect different elements to form a more complex idea at different levels of clauses and phrases (Biber et.al., 1999). Taken all salient features loaded on the positive end of this dimension, the positive end focused on presenting established knowledge.

On the negative end, were three salient features were identified, namely Past Participial WHIZ Deletion, Past Tense, and Agentless Passives. Past Participial WHIZ Deletion Relatives function as adjectives with a passive implication. They add description to the preceding noun that does some actions. Past Tense is used to claim non-generality about the views expressed by previous studies, describe research activities, mark particular activities occurring during the study, report research findings, mark generality to science, and express humbleness (Baoya, 2015; Biber, 2002; Burrough-Boenish, 2003; Getkham, 2010; Gledhill, 2000; Li & Ge, 2009). Agentless passives are used to report findings, express logical relations, and describe aspects of scientific methodology and data analysis procedures (Kanoksilpatham; 2003). The three salient lexico-grammatical features loaded on the negative end of this dimension focused on past actions.

In sum, the positive end of this dimension focused on discussion of established knowledge while the negative end emphasized presentation of past actions. Consequently, the term 'Established Knowledge and Past Action Focused' was proposed for this dimension.

TEXT SAMPLE IV (Introduction of T48) shows the use of co-occurring positive features on Dimension IV. The sample shows the use of Present Tense¹, Conjuncts², That Verb Complements³, Attributive Adjectives⁴, and Phrasal Coordinations⁵.

*In teaching negotiating skills, the focus **is**¹ usually on 'functions', such as making **and**⁵ responding to proposals or agreeing **and**⁵ disagreeing. Reported speech, **however**², **is**¹ not usually taught as part of negotiating, but **tends**¹ to be dealt within lessons devoted to grammar and written language. It **is**¹ **therefore**², perhaps, surprising that reported speech was found to occur frequently in naturally-occurring business interactions involving negotiations; especially imaginary or **hypothetical**⁴ direct reported speech, as in the example quoted in the title of this article... The finding that such uses of reported speech are frequent in negotiations **suggests**¹ **that**³ reported speech have a place in teaching negotiating skills, but as a functional device, rather than a grammatical structure.*

TEXT SAMPLE V (Method of T46) shows the use of co-occurring negative features on Dimension IV of LTRAC. The sample shows the use of Past Participial WHIZ Deletion Relation¹, Past Tense², and Agentless Passives³.

*Participants who had agreed to participate and had signed a consent form **were sent**^{2,3} a link to a web-based survey which they **were asked**^{2,3} to complete anonymously. The main aim of the survey was to explore general aspects of MC in the four multinationals. It consisted of 26 questions **divided into four clusters**¹: demographics (4 items), communication practices (4 items on a 5-point Likert scale), communication tools (3 items) and communication experience (15 items on a 5-point Likert scale).*

Dimension V contributes to 5.15 % of the total variance, containing four salient positive and only one salient negative loading. First Person Pronouns, Public Verbs, Third Person Pronouns, Causative Adverbial Subordinators, and That Deletion loaded on the positive end while By-Passives was located on the negative end. First Person Pronouns are used when the writers make claims, want to expose themselves to the readers, claim authority, or exhibit some form of ownership of the content (Harwood, 2005; Hyland, 2002; Tang & John, 1999). Public Verbs are used to report direct information or findings (Ayers, 2008; Baoya, 2015). Third Person Pronouns are used

to refer to other researchers when citing studies related to their research (Kuo, 1999). Causative Adverbial Subordinators are used to give reasons underlying the writers' comments (Sevastopoulos, 2015). That Deletion helps minimize words and make sentences more concise (Whitman, 2013). The positive end of this dimension focused on displaying the writers' ownership.

On the negative end, By-passives are used when the emphasis is on the actions, and the role of the agent is downgraded in the discourse, indexing an information focus on research activities. By-passives are frequently used to report findings, express logical relations, and describe aspects of scientific methodology. However, only one lexico-grammatical feature was not enough. Hence, a communicative function on the negative end of this dimension could not be interpreted.

As seen, the five salient lexico-grammatical features, loading on the positive end of this dimension, function as presenting the writers' ownership. Hence, the term 'Ownership Focused' was proposed for this dimension.

TEXT SAMPLE VI shows the use of co-occurring positive features on Dimension V. The sample shows the use of First Person Pronouns¹, Public Verbs², Third Person Pronouns³, Causative Adverbial Subordinators⁴, and That Deletion⁵.

With this background in mind, we¹ now describe² our¹ methods for answering the research questions. We¹ briefly discuss² that⁵ the instrument, the participants, the data analysis, and the raters.... The 81 NNES students all hailed from varying L1 backgrounds, and all were provisionally admitted to² the university because⁴ they³ scored below the university standard on language admission tests. When students are provisionally admitted to this university, they³ are placed in a semi-intensive English as an International Language (EIL) program. The NNES students who participated in the study possessed proficiency levels ranging from high-intermediate to advanced on the ACTFL scale. The NNES students represent a convenience sample, chosen from intact groups based on when the students were enrolled in an EIL

*writing class. To facilitate comparisons, all writing samples were analyzed using the WCR, EFTR, and EFCR. To determine the WCRs, each writing sample was divided into clauses and weighted according to its communicative adequacy as outlined by Wigglesworth and Foster. After weighting the clauses, the data were reduced to ratios. To determine the EFTRs, each writing sample was divided into T-units, which were then categorized as T-units either with or without errors. This resulted in a ratio of error-free T-units to total T-units. To determine the EFCRs, each writing sample was divided into clauses, which were further categorized as clauses either with or without errors. Similarly, this produced a ratio of error-free clauses to total clauses. Data analysis Since one of this study's aims was to examine if facets other than linguistic accuracy interacted with and influenced a student's accuracy score, MFRM was employed using the FACETS software package. The defined facets were participants ($n = 97$), topics ($n = 42$), task order ($n = 4$), and raters ($n = 2$). **Because**⁴ each ratio was used to measure the same construct, measurement method was not included as a separate facet so as to avoid violating the requisite assumption of local independence.*

In Dimension VI, the salient positive loadings on this dimension were Gerunds, Present Participial WHIZ Deletion Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives. The negative loadings included Pire-piping Relative Clauses and Time Adverbials. On the positive end, Gerunds are used to determine the noun (Biber, 1988; Grieve et.al, 2008; Halliday, 1994; Halliday & martin, 1993; Myers, 1994). Present Participial WHIZ Deletion Relatives function as adjectives, adding description to the preceding noun. Average Word Length marks great density of information because longer words have more specific, specialized meaning than shorter words. The higher the average word length of a text is, the higher its informational density is (Biber, 1988). However, average word length further marks very precise lexical choices resulting in an exact presentation of informational content (Biber, 1995; Getkham, 2010). Present Participial Clauses are shortened, dependent clauses and a form of adverbial clauses, enabling the article

writers to provide information in an economical way. *Demonstrative Adjectives* help refer to entities outside the text, and particularly in writing, to specific nominal entities or to inexplicit, often abstract, concepts in text. Demonstrative adjectives make it possible for the writer to discuss different aspects of the present study mentioned near and far in the text, achieving referential cohesion. Entities can include the research itself as a whole or a wide range of aspects of the research such as research questions, participants, results, etc. That is, Entities refer to preceding text or the textual context. This feature allows shared knowledge to be established between readers and the writers (Baoya, 2015; Chafe, 1985; Halliday and Hasan, 1976; Kanoksilpatham, 2003). On the negative end, *Pire-piping Relative Clauses* are used to expand informational idea units and for more exact and explicit reference in writing (Biber, 2002; Chafe, 1985). *Time Adverbials* are used to indicate time. However, only two salient negative features could not perform any clear communicative functions. Hence, the function was not interpreted.

In sum, the positive end of this dimension measures the extent to which texts vary in terms of modifying information. Thus, 'Modified Information Focused' was proposed for this dimension.

TEXT SAMPLE VII (Methods of T45) shows the use of co-occurring positive features on Dimension VI. The sample shows the use of *Gerunds*¹, Present Participial WHIZ Deletion Relatives², Present Participial Clauses³, and Demonstrative Adjectives⁴.

*The process used to categorize the articles was as follows: I first reviewed all the abstracts published in the online journals, **searching for explicit reference to the research method used**³, and excluded the studies that were clearly non-empirical. The remaining articles were then roughly divided into those **using² primarily qualitative or quantitative methods**. Any study that did not collect and statistically analyze substantial numerical data was deemed to be qualitative. However, studies based primarily on closed questionnaires or surveys were labeled as quantitative, whether or not they used statistical analyses or just simple numerical counts and percentages,*

whereas those based on open-ended questionnaires or semi-structured interviews were considered qualitative, especially as the latter were often associated with other qualitative methods. Normally, it was clear from the abstract whether the method was qualitative or quantitative. Where an article was difficult to categorize based on the abstract alone, the materials and methods section was examined, and a determination was made, based on the criteria described in the previous section. As discussed above, corpus-based research presented some difficulties in categorization. Many of the earlier studies tended to be focused on simple frequency and distribution counts, but as the field of corpus-based research has developed, more sophisticated schemes involving phases of qualitative semantic analysis as well as quantitative analysis have emerged². If a corpus-based study contained any statistical analysis beyond simple numerical counting¹, and did not have an explicit qualitative phase, it was deemed quantitative. The term 'mixed method' was rarely used in the field of ESP during early years of the decade, and not many authors seemed to be aware of it, even though the term 'qualitative/quantitative' was used. Studies referred to as 'qualitative/quantitative' by their authors were categorized as 'mixed' provided they contained both numerical data and statistics, even if they did not fit the stricter criteria of Tashakkori and Creswell (2007) or Ivankova and Creswell (2009) that are described earlier in this⁴ paper. Some researchers in ESPj and JEAP categorized their research as 'multi-level' or 'multi-method.'

Discussion

The results show that Language Teaching Research Article Corpus (LTRAC) comprises of six dimensions (or stylistic patterns). All dimensions consist of a set of co-occurring lexico-grammatical features. However, unlike other dimensions, Dimension IV consists of both negative and positive ends.

The six dimensions were respectively named 'Persuasion Focused', 'Evaluative Stance Focused', 'Claim Focused', 'Established Knowledge versus Past Action Focused', 'Ownership Focused', and 'Intention Focused'. Comparing to Baoya's (2010), Getkham (2010), Kanoksilpatham's (2003) labels, some labels, assigned to the

dimensions found in this study, were similar while others were different.

Results indicated that 'Persuasion Focused' in Dimension I was restricted to providing the writers' persuasions. The findings were in accordance with Biber's (1988) and O'Connor (2009) studies in that Split Auxiliaries, Possibility Modals and Infinitives co-occurred to perform persuasive expressions. Although this dimension was labeled 'Persuasion Focused', Biber (1988) named this dimension 'Overt Expression of Persuasion'.

'Evaluative Stance Focused' in Dimension II consisted of seven salient positive lexico-grammatical features. Surprisingly, the finding was similar to those of several researchers (Auria, 2008; Baoya, 2015; Biber, 1988; Charles, 2006; Hunston & Thompson, 2001; Getkham, 2010; Kanoksilpatham, 2003; Soler, 2002; Tutin, 2009) in that Be as Main Verbs tended to co-occur with Predicative Adjectives, and Emphatics to express evaluative stance. Although, this dimension was labeled 'Evaluative Stance Focused', Baoya (2015) named this dimension 'Evaluative Stances' in his corpus while Biber (1988), Getkham (2010), and Kanoksilpatham (2003) labeled it differently as 'Evaluative Stance'.

'Claim Focused' in Dimension III consisted of seven salient positive lexico-grammatical features. The findings were in congruence with those of other researchers (Biber et.al., 1999; Getkham, 2010; Hewings & Hewings, 2002; Hunston & Sinclair, 2000; Kanoksilpatham, 2003; Martin, Matthiessen, & Painter, 1997; Thompson, 1994) in that the authors applied the Pronoun It with That Verb Complements, That Deletions, and Private Verbs to claim the importance of the findings. Although, this dimension was labeled 'Claim Focused', Getkham (2010) and Kanoksilpatham (2003) named this manner of discourse in their corpora as 'Framing Claims'.

'Established Knowledge Focused' on the positive end of Dimension IV consisted of five salient positive lexico-grammatical

features. This was in congruence with those of other researchers (Baoya, 2015; Charak & Norouzi, 2013; Getkham, 2010; Hartwell & Jacques, 2014; Kanoksilpatham, 2003; Li & Ge, 2009; Matthews & Matthews, 2007; Swales, 1990; Tod-Trimble & Trimble, 1982) in that the Present Tense co-occurred with Attributive Adjectives and Phrasal Coordinations to provide the reader with some established knowledge in the field. Albeit this dimension was labeled 'Established Knowledge Focused', Baoya (2015) named it as 'Current Information', Getkham (2010) named it as 'Expression of Generality', while Kanoksilpatham (2003) named it as 'Attribute Knowledge',

'Past Action Focused' on the negative end of Dimension IV consisted of three salient negative lexico-grammatical features. The result was also in line with those of other researchers (Baoya, 2015; Bazerman, 1988; Burrough – Boenish, 2003; Charak & Norouzi, 2013; Gledhill, 2000; Halliday, 2013; Hartwell & Jacques, 2014; Getkham, 2010; Kanoksilpatham, 2003; Malcolm, 1987; Martin, 2003; Matthews & Matthews, 2007; Riley, 1991; Salager-Meyer, 1992; Smith & Bernhardt, 1997; Swales, 1990; Swales & Feak, 2004; Tarone *et.al.*, 1981; Taylor, 2001; Tod-Trimble & Trimble, 1982; Wilkinson, 1992; Wingard, 1981) in that when any form of *Passives* co-occurred with the *Past Tense*, they implicitly discussed past actions. Albeit this dimension was named 'Past Action Focused', Baoya (2010) named it 'Past Action',

'Ownership Focused' in Dimension V consisted of five salient positive lexico-grammatical features. Astonishingly, the result was as those of other scholars (Bazerman, 1988; Getkham, 2010; Kanoksilpatham, 2003; Hartwell & Jacques, 2014) in that when Person Pronouns loaded significantly on any dimension, they implicitly manifested the writer's ownership. Granting this dimension was named as 'Ownership Focused', Getkham (2010) labeled it as 'Expression of Ownership'.

‘Modified Information Focused’ in Dimension VI consisted of five salient positive lexico-grammatical features. Interestingly, this finding was like Baoya’s (2015) study in that modifying information can be noticed by the co-occurrence of Present Participial WHIZ Deletion Relatives and Present Participial Clauses. Albeit this dimension was labeled ‘Modified Information Focused’, Baoya (2015) named it ‘Modified Information’,

When comparing the results specifically with Baoya’s (2015) and Getkham’s (2010) corpora, which similarly contained social sciences research articles but from different disciplines, four out of the six dimensions in LTRAC were found in Baoya’s corpus. Baoya’s corpus and LTRAC similarly contained ‘Evaluative Stance Focused’, ‘Established Knowledge Focused’, ‘Past Action Focused’, and ‘Modified Information Focused’. However, ‘Logical Probability’, ‘Commentary’, and ‘Unsatisfactory Status Quo’ were only found in Baoya’s corpus. Moreover, five out of the six dimensions in LTRAC were found in Getkham’s corpus. Both Getkham’s corpus and LTRAC comprised of ‘Established Knowledge Focused’, ‘Evaluative Stance Focused’, ‘Claim Focused’ and ‘Ownership Focused’. If combining the comparisons of LTRAC with Baoya’s and Getkham’s corpora, it could be said that all patterns revealed in LTRAC were similar to those found in both studies.

Presumably, that some dimensions of this study were similar to and some were slightly different from ones of the three scholars (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003) might be because all studies investigated similar research articles in different disciplines. Each has its own style of linguistic devices used. Moreover, what made LTRAC slightly different from Baoya’s (2015) and Getkham’s (2010) corpora was the number of dimensions revealed in the corpora. This might be because of different sizes of the corpora, and different number of lexico-grammatical features investigated (Pallant, 2007; Sapnas & Zeller, 2002).

From the findings of this research study, the following implications can be applied into classroom practice or for future research studies.

The findings of this study asserts that professional language teaching research article writers employ 42 salient lexico-grammatical features to create 6 stylistic patterns. The use of these patterns depends primarily on the functional properties and the textual variation.

The findings of this study could therefore be provided to teachers of English in academic writing courses, novice and non-native researchers, as well as students particularly in this discipline to utilize the knowledge of this study to improve their writing skill.

Teachers can encourage students to study the language using a data-driven, inductive approach (Beatty, 2003 as cited in Getkham, 2010). With teacher encouragement, this process can both stimulate students' curiosity and encourage them to actively and independently engage with the language. Incorporating this strategy into the curriculum may help students read efficiently and eventually utilize this style of discourse in their writing to increase the chance of having their papers accepted for publication.

Teachers can also encourage students to frequently practice the use of these 42 salient lexico grammatical features with 6 stylistic patterns for the student to effectively convey information in research articles.

In terms of lexico-grammatical features, there are several functions of modals to be introduced. The corpora reveal that this feature plays an important role in academic writing since there are three main categories of modals – prediction modals, possibility modals, and necessity modals providing diverse communicative functions. For example, possibility modals help denote the authors' assessment, necessity modals help convey the writer's obligation, and prediction modals help mark predictions of events or outcomes. Therefore, the student would likely benefit from explicit teaching in their academic writing classes, focusing on how and when to use these

modals appropriately to be able to communicate unequivocally. Moreover, other lexico-grammatical features that should be introduced are reduced adjective clauses. The students need to apply these features in their academic writing since these features are quite important in the academic genre.

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